Technical Procedures for Processing with Ninhydrin

1 Scope

Ninhydrin is used by FBI Laboratory Friction Ridge Discipline personnel to develop prints on porous and semi-porous surfaces. It reacts with the amino acids that are present in perspiration.

2 Equipment/Materials/Reagents

Humidity chamber or steam producing device

Ninhydrin

Acetone

Petroleum Ether

Isopropanol

Methanol

3 Procedures

3.1 Solution Preparation

Personnel will prepare the solutions as follows. Alterative amounts may be prepared, provided the same ratio of chemicals mixed is retained.

3.1.1 Ninhydrin (Petroleum Ether) Solutions (Large Quantity)

3.1.1.1 Ninhydrin stock solution

Combine:

- Ninhydrin – 700 g
- Methanol – 3500 mL

Stir until Ninhydrin dissolves.

3.1.1.2 Ninhydrin working solution

Remove 1500 mL of Petroleum Ether from the approximately 20 L container.

Combine:

- Isopropyl Alcohol – 800 mL
- Ninhydrin stock solution – 700 mL

Add to the remaining Petroleum Ether in the approximately 20 L container.

Agitate container to mix solution.

3.1.2 Ninhydrin (Petroleum Ether) Working Solution (Small Quantity)

Combine:

- Ninhydrin – 5 g
- Methanol – 30 mL

Stir until Ninhydrin dissolves.

Add:

- Isopropyl Alcohol – 40 mL
- Petroleum Ether – 930 mL

3.1.3 Ninhydrin (Acetone) Working Solution

Combine:

- Ninhydrin - 6 g
- Acetone - 1000 ml

Stir until Ninhydrin dissolves.

3.2 Application

3.2.1 Standard Method

Personnel will complete the following steps in order:

1. Apply solution to item.
2. Allow item to dry completely.
3. Place in humidity chamber at 70%-80% relative humidity and 70-80°C for approximately 5 minutes or until desired development occurs.

For digital capture and photography, see FBI Friction Ridge Discipline Processing Manual Preamble.

3.2.2 Alternate Methods for Development

3.2.2.1 Personnel may apply damp heat with a steam producing device (e.g., steam iron) for several minutes. If latent print development is insufficient, continue to apply damp heat for a few additional minutes.

3.2.2.2 In some circumstances, heat may be detrimental to the condition of the item(s). In these circumstances, the item(s) may be left to dry and then placed in a sealed bag or container at least overnight or until development occurs.

3.2.2.3 The use of alternate methods must be recorded in the case record. If an alternate method is used to test a reagent, the method needs to be recorded in the reagent log or the case record (if off site).

3.3 Storage of Solutions

Stock solution must be stored in a dark glass bottle.

Working solution may be stored in any of the following receptacles:

- Dark glass bottle
- Metal can
- Stainless steel container

3.4 Shelf Life

Stock solution has an indefinite shelf life provided the reagent checks are satisfactory.

Working solution has a shelf life of 1 year provided the reagent checks are satisfactory.

4 Standards and Controls

See FBI Friction Ridge Discipline Processing Manual, Preamble.

5 Safety

See FBI Laboratory Safety Manual for appropriate information.

6 Sampling

Not applicable.

7 Calculations

Not applicable.

8 Measurement Uncertainty

Not applicable.

9 Limitations

Not applicable.

10 References

FBI Laboratory Safety Manual, Federal Bureau of Investigation, Laboratory Division. Latest Revision.

FBI Friction Ridge Discipline Processing Manual, Preamble, Federal Bureau of Investigation, Laboratory Division. Latest Revision.

Oden, S. and von Hofsten, B. "Detection of Fingerprints by the Ninhydrin Reaction". *Nature*. 173:449.

Petruncio, A. V. "A Comparative Study for the Evaluation of Two Solvents for Use in Ninhydrin Processing of Latent Print Evidence". *JFI.* 50(5):462.

Trozzi, T. A., Schwartz, R. L., and Hollars, M. L. *Processing Guide for Developing Latent Prints*, FBI Laboratory, Washington DC, 2001.

Rev. #	Issue Date	History
1	10/02/17	Specific section numbers referenced in Preamble removed throughout document. Section 1, latent print personnel added. Section 4 removed and remaining renumbered. Titles for Section 4 and Section 7 modified. Section 9, generalized. Updated for Biometrics Analysis Unit. References Updated. Abbreviations addressed.
2	07/15/21	Replace Latent Print Units with Friction Ridge Discipline. Minor wording changes. Streamline equipment list and generalized steam iron. Re-organization and re-numbering of sections. Section 3.1 separated into Section 3.1.1 and Section 3.1.3 and added Section 3.1.2 from previous version of Ninhydrin document. Section 3.2.2.1, generalized steam iron. Section 3.2.2.2, modified expectations for development. Section 3.2.2.3, added location. Section 4, added Preamble reference.

Approval

Redact - Signatures on File

Friction Ridge Discipline
Technical Leader Date: 07/14/2021

Latent Print Operations
Unit Chief Date: 07/14/2021

Latent Print Support Unit
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